Trend Study 5-2-01

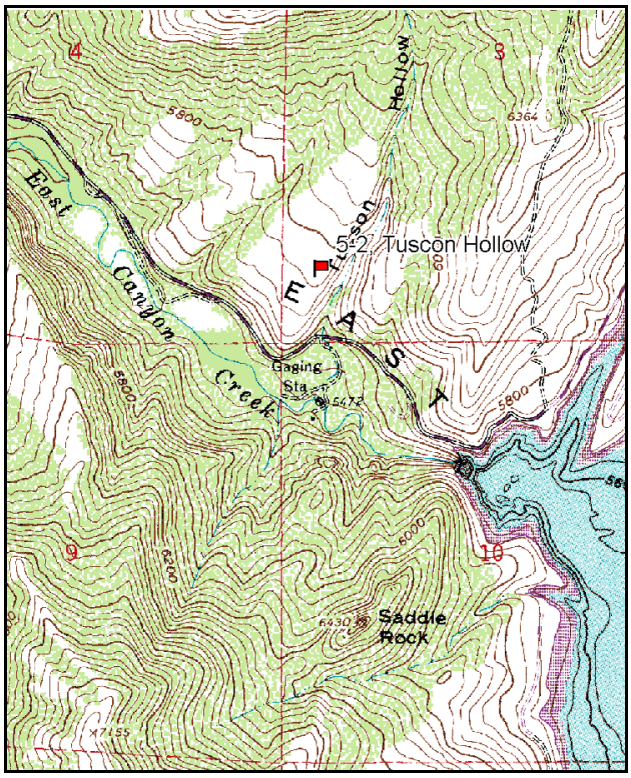
Study site name: Tucson Hollow . Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 204 degrees magnetic.

Frequency belt placement: Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

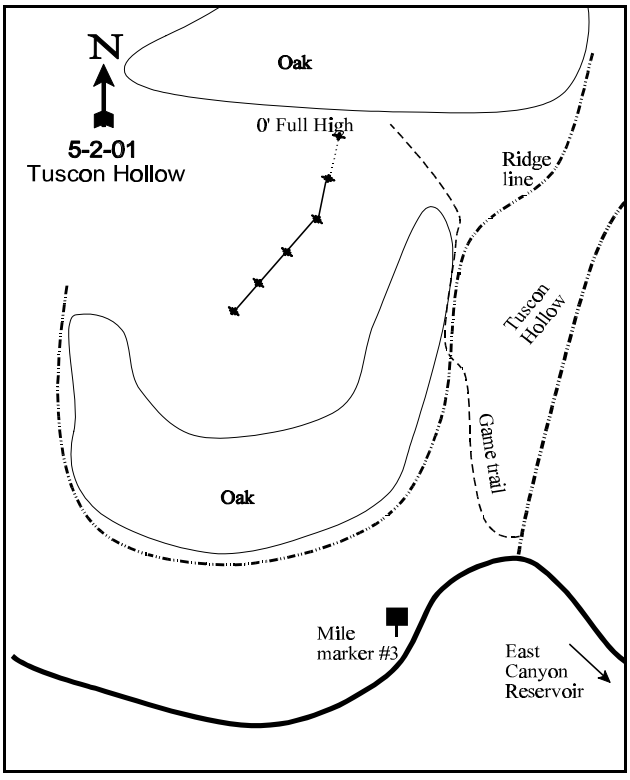
LOCATION DESCRIPTION

From the dam at East Canyon Reservoir, proceed 0.2 miles northwest past Tucson Hollow, and stop near mile marker 3. Walk up the slope following a game trail (to the northeast) to the plateau. Walk through the oak stand bordering the ridge line continuing northeast to an opening in the oak. Look for a full high fence post on the north side of the opening. This full high fence post is the 0-foot stake. The baseline runs 208 degrees magnetic. At the 200-foot baseline stake the baseline doglegs and runs 229 degrees magnetic.



Map Name: East Canyon Reservoir

Township 2N , Range 3E , Section 3



Diagrammatic Sketch

UTM 4530600 N 448928 E

DISCUSSION

Trend Study No. 5-2

The Tucson Hollow study is located on a nearly level bench just north and east of East Canyon Reservoir. It was originally placed in a nearby thick patch of Gambel oak brush. Because there was very little apparent utilization in the dense oak, the site was moved just south of the original study in 1996. The site now samples a big sagebrush/grass opening about 25 to 30 acres in size surrounded on 3 sides by oak clones. Aspect on the site is south with a slope of 3%. Elevation is about 5,800 feet. In 1990, three winter-killed deer were found in the immediate vicinity as well as several antler drops. Deer and elk pellet groups are scattered throughout the area. Quadrat frequency of deer pellet groups was 17% in 1996 and 2001. In addition, a pellet group transect read on site in 2001, estimated 31 deer days use/acre (76 ddu/ha). Most of the deer pellet groups encountered were from spring use.

Soil is “Manila Loam,” a classification that occurs only on localized mountain slopes. Soil textural analysis indicates a clay loam soil with a slightly acidic soil reaction (6.5 pH). This soil has limited crop and pasture capability and is highly susceptible to "slippage." It is moderately deep with a reddish-brown color. Few rocks were encountered in the soil profile and the effective rooting depth was estimated at almost 13 inches. Water permeability is slow and available water capacity is high, as is the erosion hazard. The site has a good vegetative and litter cover that precludes most erosion. The erosion condition class was determined as stable in 2001.

The site supports a variety of browse species but sagebrush and stickyleaf low rabbitbrush provide over two thirds of the shrub cover. Sagebrush on the site displays characteristics of both basin big sagebrush (*Artemisia tridentata tridentata*) and mountain big sagebrush (*Artemisia tridentata vaseyana*). All sagebrush was classified as Basin big sagebrush which had an estimated density of 1,400 plants/acre in 1996. Seventy-six percent of the plants were classified as mature with a percent decadency of 19%. No seedlings were encountered. Average plant height was 26 inches with a crown width of 35 inches. Density remained similar in 2001 at 1,220 plants/acre. Use was light, vigor good on most plants, and percent decadence remained low at 15%.

Stickyleaf low rabbitbrush had an estimated density of 1,620 plants/acre in 1996, increasing slightly to 1,740 plants/acre in 2001. Almost all plants were classified as mature. The shrub species with the highest density was Oregon grape with an estimated density of 18,740 plants/acre in 2001. These plants are very small measuring only 4 to 5 inches in height with a 6 inch crown. It is a mostly mature population with no utilization visible. Antelope bitterbrush, Saskatoon serviceberry, and chokecherry are scattered throughout the site and exhibit moderate to heavy hedging. Bitterbrush shows the heaviest use with most all available plants exhibiting a clubbed growth form. They provided 19% of the browse cover in 1996 and 16% in 2001. However, bitterbrush occurs at a relatively low density of about 200 plants/acre. At this low density heavy use is inevitable considering the low numbers of other highly palatable browse like serviceberry and elderberry. Other browse include a few white rubber rabbitbrush and snowberry.

The herbaceous understory is productive with good diversity. However, cheatgrass and Japanese brome dominate the understory, making up 81% of the grass cover and 54% of the total herbaceous cover in 1996. Due to the dry and spring conditions of 2001, cheatgrass and Japanese brome have declined significantly in nested frequency and percent cover has dropped nearly sevenfold from 19% to 3%. In response to the decline in annual grasses, perennial grasses increased substantially. Common species include Sandberg bluegrass, Kentucky bluegrass, bluebunch wheatgrass, and Great Basin wildrye.

Forbs are diverse with 26 species encountered in 1996 and 34 species in 2001. Some of the larger forbs include silvery lupine, balsamroot, oneflower helianthella, yellow salsify, and Pacific aster. Other forbs are in relatively low numbers and contribute little to overall herbaceous understory cover.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable with abundant vegetative and litter cover. Bare ground cover is estimated at less than 4%. Erosion was not evident in 1996. Browse species do not appear to be expanding at this time with most exhibiting mature stable populations. The abundant annual grasses will out-compete browse seedlings for early season soil moisture most years, not allowing them to become easily established. Some browse show heavy utilization, but these are the species that occur in low densities. The herbaceous understory is dominated by annual species, primarily cheatgrass and Japanese brome, which contribute 54% of the herbaceous cover. Removing these species from the understory would be difficult. There are some perennial grasses present that are more desirable, but they only contribute 13% of the total herbaceous cover.

2001 TREND ASSESSMENT

Trend for soil is stable with abundant herbaceous vegetation and litter cover to protect the soil. The erosion condition class was also determined as stable. Trend for browse is stable for basin big sagebrush but down for the less abundant but more preferred bitterbrush. Sagebrush provides 34% of the browse cover with 1,220 plants/acre estimated. Bitterbrush provides only 16% of the browse cover with only 180 plants/acre estimated. Overall, the browse trend is considered stable. Reproduction for both species is nonexistent this year and only bitterbrush growing out of reach to browsing, produced any flowers this year. Unutilized annual leaders of bitterbrush averaged just over 3 inches which is slightly above the unit average. Trend for the herbaceous understory is up with sum of nested frequency for perennial grasses and forbs more than doubling since 1996. In addition, cheatgrass and Japanese brome declined significantly and average cover of these annual grasses dropped from 19% to 3%. Sum of nested frequency for perennial grasses and forbs more than doubled with the decrease in annual cover and their subsequent reduced competition for limited resources, primarily water.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up (5)

HERBACEOUS TRENDS --
Herd unit 05 , Study no: 2

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron dasystachyum	-	4	-	2	-	.03
G	Agropyron intermedium	-	3	-	2	-	.06
G	Agropyron spicatum	33	33	12	12	1.09	1.66
G	Bromus japonicus (a)	344	*114	85	48	14.94	.69
G	Bromus tectorum (a)	216	*136	53	53	4.38	2.17
G	Elymus cinereus	2	1	2	1	.01	.63
G	Melica bulbosa	-	5	-	1	-	.15
G	Poa bulbosa	-	*41	-	12	-	1.50
G	Poa pratensis	19	*71	7	21	.25	2.20
G	Poa secunda	141	*315	50	78	3.16	19.95
Total for Annual Grasses		560	250	138	101	19.32	2.86
Total for Perennial Grasses		195	473	71	129	4.51	26.21
Total for Grasses		755	723	209	230	23.84	29.07
F	Achillea millefolium	49	61	17	21	1.00	1.93
F	Agoseris glauca	-	*16	-	7	-	.08
F	Alyssum alyssoides (a)	17	*65	7	29	.08	.73
F	Allium spp.	-	*137	-	57	-	1.44
F	Artemisia ludoviciana	-	1	-	1	-	.03
F	Aster chilensis	27	*50	11	17	2.05	1.79
F	Astragalus convallarius	3	*15	3	7	.05	.25
F	Balsamorhiza macrophylla	11	14	3	6	.91	2.16
F	Balsamorhiza sagittata	-	5	-	1	-	.81
F	Camelina microcarpa (a)	3	*17	2	7	.01	.13
F	Cirsium undulatum	24	*4	12	2	.33	.07
F	Collomia linearis (a)	5	6	1	2	.00	.03
F	Comandra pallida	17	24	9	11	.21	.42
F	Collinsia parviflora (a)	-	*117	-	34	-	1.07
F	Crepis acuminata	6	14	2	6	.06	.57
F	Cynoglossum officinale	4	4	3	1	.21	.15
F	Descurainia pinnata (a)	28	*-	12	-	.59	-
F	Draba spp. (a)	2	10	1	3	.00	.04
F	Epilobium brachycarpum (a)	-	3	-	2	-	.01
F	Erodium cicutarium (a)	-	5	-	1	-	.15
F	Galium aparine (a)	23	29	10	11	.17	.61

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Gayophytum ramosissimum (a)	57	*-	23	-	.55	-
F	Helianthella uniflora	12	19	5	7	1.76	1.92
F	Heterotheca villosa	-	5	-	1	-	1.58
F	Holosteum umbellatum (a)	18	25	5	7	.40	.66
F	Lappula occidentalis (a)	5	*48	2	14	.15	.14
F	Lactuca serriola	29	22	12	9	.13	.76
F	Lithospermum ruderale	-	-	-	-	.03	-
F	Lomatium spp.	8	-	3	-	.04	-
F	Lupinus argenteus	28	37	13	13	1.93	3.34
F	Machaeranthera canescens	12	*-	5	-	.05	-
F	Phlox longifolia	-	*22	-	8	-	.09
F	Polygonum douglasii (a)	51	*6	24	3	.19	.01
F	Ranunculus testiculatus (a)	-	7	-	2	-	.01
F	Senecio integerrimus	-	2	-	1	-	.03
F	Sisymbrium altissimum (a)	13	*33	6	18	.27	1.25
F	Taraxacum officinale	-	*12	-	7	-	.16
F	Tragopogon dubius	41	*153	23	66	.55	4.56
F	Vicia americana	21	*117	11	43	.10	2.57
Total for Annual Forbs		222	371	93	133	2.45	4.88
Total for Perennial Forbs		292	734	132	292	9.46	24.78
Total for Forbs		514	1105	225	425	11.92	29.66

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 05 , Study no: 2

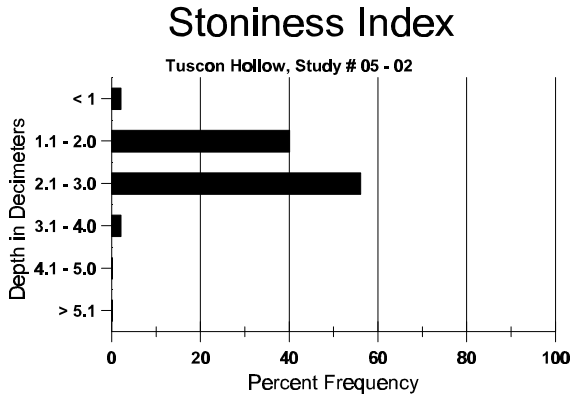
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Amelanchier alnifolia	2	3	.18	.00
B	Artemisia tridentata tridentata	46	39	6.76	7.79
B	Chrysothamnus nauseosus albicaulis	2	0	.38	-
B	Chrysothamnus viscidiflorus viscidiflorus	43	45	6.92	8.61
B	Gutierrezia sarothrae	0	1	-	.03
B	Mahonia repens	41	42	2.50	1.93
B	Purshia tridentata	8	6	4.13	3.76
B	Symphoricarpos oreophilus	6	4	1.06	.91
Total for Browse		148	140	21.95	23.06

BASIC COVER --
Herd unit 05 , Study no: 2

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '96	Average Cover % '01
Vegetation	481	474	57.73	72.55
Rock	62	32	1.45	1.56
Pavement	74	15	.71	.32
Litter	499	475	68.56	52.19
Cryptogams	3	-	.01	0
Bare Ground	133	82	3.37	3.33

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 02, Tucson Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.5	66.8 (14.7)	6.5	33.9	37.1	29.0	4.2	29.8	304.0	.6



PELLET GROUP FREQUENCY --
Herd unit 05 , Study no: 2

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	6	1	26	N/A
Elk	5	1	-	-
Deer	17	17	400	31 (76)
Cattle	-	1	-	-

BROWSE CHARACTERISTICS --
Herd unit 05 , Study no: 2

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	-	1	1	-	-	-	-	-	-	2	-	-	-	40	27	29	2
	01	-	-	2	-	-	-	-	-	-	2	-	-	-	40	34	28	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	50%	50%	00%	+33%
'01	00%	67%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'96	40	Dec:	-
	'01	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	39	13	-	1	-	-	-	-	-	52	-	1	-	1060	26	35	53
	01	50	2	-	-	-	-	-	-	-	52	-	-	-	1040	31	38	52
D	96	4	9	-	-	-	-	-	-	-	8	-	-	5	260			13
	01	8	1	-	-	-	-	-	-	-	4	-	1	4	180			9
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	860			43
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	400			20

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	31%	00%	09%	-13%
'01	05%	00%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	1400	Dec:		19%
'01	1220			15%

Chrysothamnus nauseosus albicaulis																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	2	-	-	-	-	-	-	-	-	1	-	1	-	40	53	68	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	33%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	60	Dec:		-
'01	0			-

Chrysothamnus viscidiflorus viscidiflorus																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	74	1	-	3	-	-	-	-	-	78	-	-	-	1560	20	37	78
	01	82	-	-	-	-	-	-	-	-	82	-	-	-	1640	21	33	82
D	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	01%	00%	00%	+ 7%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	1620	Dec:		2%
'01	1740			5%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	9	0
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor									%Change		
	'96		00%		00%		00%											
	'01		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)													'96		0	Dec:		-
													'01		60			-
Mahonia repens																		
S	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	51	-	-	17	-	-	-	-	-	68	-	-	-	1360			68
	01	34	-	-	-	-	-	-	-	-	34	-	-	-	680			34
M	96	295	-	-	71	-	-	-	-	-	366	-	-	-	7320	5	6	366
	01	506	-	-	397	-	-	-	-	-	903	-	-	-	18060	4	5	903
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor									%Change		
	'96		00%		00%		00%									+54%		
	'01		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)													'96		8680	Dec:		-
													'01		18740			-
Prunus virginiana																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	15	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor									%Change		
	'96		00%		00%		00%											
	'01		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)													'96		0	Dec:		-
													'01		0			-
Purshia tridentata																		
M	96	-	-	2	-	-	8	-	-	-	10	-	-	-	200	38	63	10
	01	-	1	-	-	-	2	-	-	1	4	-	-	-	80	30	66	4
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	3	-	-	2	3	-	-	2	100			5
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor									%Change		
	'96		00%		100%		00%									-10%		
	'01		11%		89%		22%											
Total Plants/Acre (excluding Dead & Seedlings)													'96		200	Dec:		0%
													'01		180			56%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sambucus cerulea																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	93	81	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	0	Dec:		-
'01	0			-

Symphoricarpos oreophilus																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	8	-	2	-	-	-	-	-	-	10	-	-	-	200	21	30	10
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140	24	41	7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	17%	00%	-42%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	240	Dec:	-
'01	140		-